Academic Team – Math Practice Test (Sample)

Study Guide

Everything you need from our exam experts!

Questions

1. **What are the new coordinates for vertex B after rotating the triangle with vertices A (2, 3), B (-1, 2), and C (1, -3) counter-clockwise 90 degrees about the origin?**

   A. (-2, -1)

   B. (1, -2)

   C. (-1, 2)

   D. (2, 1)

2. **What height in feet does the baseball reach given the equation $y = -14x^2 + 84x + 4$?**

   A. 120

   B. 130

   C. 140

   D. 150

3. **What is the distance between the points (-3, 1, 2) and (4, 3, -2) to the nearest tenth?**

   A. 7.5

   B. 8.3

   C. 9.1

   D. 10.0

4. **In triangle ABC, if side AB is congruent to side BC and angle A measures 47°, what is the measure of angle B?**

   A. 47°

   B. 86°

   C. 43°

   D. 90°

5. **What is the sum of k going from 1 to 3 of k!/k^k in improper fraction form?**

   A. 31/18

   B. 16/9

   C. 3/2

   D. 20/11

6. What is the perimeter of a triangle with sides measuring 4 inches, 7 inches, and 8 inches?

A. 19 inches

B. 20 inches

C. 21 inches

D. 22 inches

7. Based on the logical statements provided, what can be concluded if Q is not green?

A. M is yellow

B. Q is yellow

C. M is not yellow

D. M is green

8. What is the exact area of a triangle with sides measuring 7, 8, and 9 in simplest form?

A. 12sqrt(5)

B. 14sqrt(3)

C. 24

D. 21

9. What is the value of x, to three decimal places, in the equation 4^(2x) = 60?

A. 1.247

B. 1.477

C. 1.500

D. 1.600

10. If a cylindrical container's height is 8 inches and radius is 2.5 inches, what is the area of a label that is ¾ the height of the cylinder and overlaps by 1 inch?

A. 90 square inches

B. 93 square inches

C. 95 square inches

D. 100 square inches

Answers

1. A
2. B
3. B
4. B
5. A
6. A
7. C
8. A
9. B
10. B

Explanations

1. What are the new coordinates for vertex B after rotating the triangle with vertices A (2, 3), B (-1, 2), and C (1, -3) counter-clockwise 90 degrees about the origin?

A. (-2, -1)

B. (1, -2)

C. (-1, 2)

D. (2, 1)

To find the new coordinates of vertex B after a 90-degree counter-clockwise rotation about the origin, we can use the formula that describes how points (x, y) transform under such a rotation. The transformation for a 90-degree counter-clockwise rotation can be represented as: \[(x, y) \rightarrow (-y, x) \] Applying this transformation to the coordinates of vertex B, which are initially (-1, 2): 1. Substitute -1 for x and 2 for y: - The new x-coordinate becomes -y, which is -2. - The new y-coordinate becomes x, which is -1. Thus, the coordinates for vertex B after the rotation are (-2, -1). This means that the transformation has successfully shifted vertex B from its original position to the new position reflected in the answer choice. The coordinates (-2, -1) represent the correct transformed position of vertex B after the specified rotation.

2. What height in feet does the baseball reach given the equation $y = -14x^2 + 84x + 4$?

A. 120

B. 130

C. 140

D. 150

**To determine the maximum height that the baseball reaches given the equation \(y = -14x^2 + 84x + 4 \), we need to analyze the quadratic function. The equation is in the form \(y = ax^2 + bx + c \), where \(a = -14 \), \(b = 84 \), and \(c = 4 \). The vertex of a parabola defined by a quadratic equation \(y = ax^2 + bx + c \) can be found using the formula for the x-coordinate of the vertex, which is given by \(x = -\frac{b}{2a} \). Substituting in the values from our equation, we have: \[x = -\frac{84}{2 \cdot -14} = \frac{84}{28} = 3 \] Now, we substitute \(x = 3 \) back into the original equation to find the corresponding height \(y \): \[y = -14(3)^2 + 84(3) + 4 \] Calculating this step-by-step: \[y = -14 \cdot 9 + 252 + 4 **

3. What is the distance between the points (-3, 1, 2) and (4, 3, -2) to the nearest tenth?

A. 7.5

B. 8.3

C. 9.1

D. 10.0

To find the distance between the points \((-3, 1, 2)\) and \((4, 3, -2)\) in a three-dimensional space, we use the distance formula for 3D points, which is given by: \[d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2} \] Here, \((x_1, y_1, z_1) = (-3, 1, 2)\) and \((x_2, y_2, z_2) = (4, 3, -2)\). 1. Calculate the differences in each coordinate: - \(x_2 - x_1 = 4 - (-3) = 4 + 3 = 7\) - \(y_2 - y_1 = 3 - 1 = 2\) - \(z_2 - z_1 = -2 - 2 = -4\) 2. Now substitute these values into the distance formula: \[d = \sqrt{(7)^2 + (

4. In triangle ABC, if side AB is congruent to side BC and angle A measures 47°, what is the measure of angle B?

A. 47°

B. 86°

C. 43°

D. 90°

In triangle ABC, since side AB is congruent to side BC, triangle ABC is an isosceles triangle. In an isosceles triangle, the angles opposite the equal sides are also equal. Therefore, angles A and B are congruent because they are opposite the equal sides AB and BC, respectively. Given that angle A measures 47°, it follows that angle B must also measure 47° since they are opposite the congruent sides. To find the measure of angle C, we can use the fact that the sum of all interior angles in a triangle is always 180°. So, we set up the equation for the sum of angles: Angle A + Angle B + Angle C = 180° Substituting the values we know: 47° + 47° + Angle C = 180° This simplifies to: 94° + Angle C = 180° To find Angle C, we subtract 94° from 180°: Angle C = 180° - 94° = 86° Thus, the measure of angle B, which we initially identified as being the same as angle A, confirms that angle B measures 47°. It's evident that the measure of angle C, which is

5. What is the sum of k going from 1 to 3 of k!/k^k in improper fraction form?

A. 31/18

B. 16/9

C. 3/2

D. 20/11

To find the sum of $\frac{k!}{k^k}$ for k going from 1 to 3, we need to calculate the individual values of $\frac{k!}{k^k}$ for each integer value of k and then sum those values. 1. For $k = 1$: $$\frac{1!}{1^1} = \frac{1}{1} = 1$$ 2. For $k = 2$: $$\frac{2!}{2^2} = \frac{2}{4} = \frac{1}{2}$$ 3. For $k = 3$: $$\frac{3!}{3^3} = \frac{6}{27} = \frac{2}{9}$$ Now, we combine these fractions to find the total sum: $$1 + \frac{1}{2} + \frac{2}{9}$$ To add these fractions, we first convert them into a common denominator. The least common multiple of the denominators $1,

6. What is the perimeter of a triangle with sides measuring 4 inches, 7 inches, and 8 inches?

A. 19 inches

B. 20 inches

C. 21 inches

D. 22 inches

To find the perimeter of a triangle, you simply add the lengths of all three sides together. In this case, the sides of the triangle measure 4 inches, 7 inches, and 8 inches. Calculating the perimeter involves the following steps: 1. Add the length of the first side (4 inches) to the length of the second side (7 inches): \(4 + 7 = 11\) inches. 2. Next, add the length of the third side (8 inches) to the sum from the previous step: \(11 + 8 = 19\) inches. Thus, the perimeter of the triangle is 19 inches. This matches with the first choice, making it the correct answer. Understanding this process is crucial: the perimeter can be found through straightforward addition of the side lengths. Any errors in this calculation can lead to incorrect conclusions, so ensuring each side is included in the sum is key to arriving at the correct perimeter.

7. Based on the logical statements provided, what can be concluded if Q is not green?

A. M is yellow

B. Q is yellow

C. M is not yellow

D. M is green

To determine what can be concluded if Q is not green, we need to analyze the logical implications that come with this condition. If Q is not green, it implies that Q must be either yellow or some other color. The specific relationships between M and Q typically involve a scenario where the properties of Q influence those of M. Depending on the problem's setup, it may be stated that if Q is not of a certain color, then M cannot be that color either. Choosing the conclusion that M is not yellow supports this logic. The implication is that M could either be green or some other color, as long as it is not yellow. Therefore, when we conclude M is not yellow based on Q being not green, we align with the logical relationships that assert constraints on M based on the conditions of Q. This reasoning reflects the nature of logical deduction, where knowing that one variable does not have a particular attribute helps to infer that another variable must also lack that attribute.

8. What is the exact area of a triangle with sides measuring 7, 8, and 9 in simplest form?

A. 12sqrt(5)

B. 14sqrt(3)

C. 24

D. 21

To find the area of a triangle with side lengths 7, 8, and 9, we can apply Heron's formula, which is useful for calculating the area when the lengths of all three sides are known. First, we calculate the semi-perimeter (s) of the triangle: \[s = \frac{a + b + c}{2} = \frac{7 + 8 + 9}{2} = 12 \] Next, we use Heron's formula, which states that the area (A) of the triangle can be calculated as follows: \[A = \sqrt{s(s-a)(s-b)(s-c)} \] Substituting the values: \[A = \sqrt{12(12-7)(12-8)(12-9)} \] \[A = \sqrt{12 \times 5 \times 4 \times 3} \] \[A = \sqrt{12 \times 60} \] \[A = \sqrt{720} \] To simplify \(\sqrt{720}\), we can factor it as follows: \[720 = 144 \times 5 \] Thus, we can express the

9. What is the value of x, to three decimal places, in the equation 4^(2x) = 60?

A. 1.247

B. 1.477

C. 1.500

D. 1.600

To find the value of \(x \) in the equation \(4^{2x} = 60 \), we start by rewriting the left side of the equation with a base of 2, since \(4 \) can be expressed as \(2^2 \). Thus, the equation becomes: \[(2^2)^{2x} = 60 \] This simplifies to: \[2^{4x} = 60 \] Next, to solve for \(x \), we take the logarithm of both sides. Using the natural logarithm (though common logarithm would yield the same result), we get: \[\ln(2^{4x}) = \ln(60) \] Applying the power rule of logarithms, we can pull down the exponent: \[4x \cdot \ln(2) = \ln(60) \] Now, to isolate \(x \), we divide both sides by \(4 \cdot \ln(2) \): \[x = \frac{\ln(60)}{4 \cdot \ln(2)} \] Using a calculator to find the values of the logarithms, we

10. If a cylindrical container's height is 8 inches and radius is 2.5 inches, what is the area of a label that is ¾ the height of the cylinder and overlaps by 1 inch?

A. 90 square inches

B. 93 square inches

C. 95 square inches

D. 100 square inches

To find the area of the label on the cylindrical container, we first need to determine the relevant dimensions of the label. The height of the cylinder is 8 inches, so the height of the label, which is three-quarters of the cylinder's height, is calculated as follows: \[\text{Height of the label} = \frac{3}{4} \times 8 = 6 \text{ inches} \] Next, we consider the overlap. The label overlaps the cylinder by 1 inch at the top and bottom, effectively reducing the actual visible height of the label. Therefore, the height that contributes to the label area is: \[\text{Effective height of the label} = \text{Height of the label} - 2 \times \text{overlap} = 6 - 2 \times 1 = 6 - 2 = 4 \text{ inches} \] Now, we need to calculate the circumference of the base of the cylinder to find the width of the label. The formula for the circumference \(C \) of a cylinder is given by: \[C = 2\pi r \] Where \(r \) is the radius.